

RSM 2005

***Regional Simulation Model***  
***Simulating South Florida's Water Needs for Today and Tomorrow***

**Welcome to the Part I RSM Peer Review**

***Jayantha Obeysekera, Ph.D., P.E.***

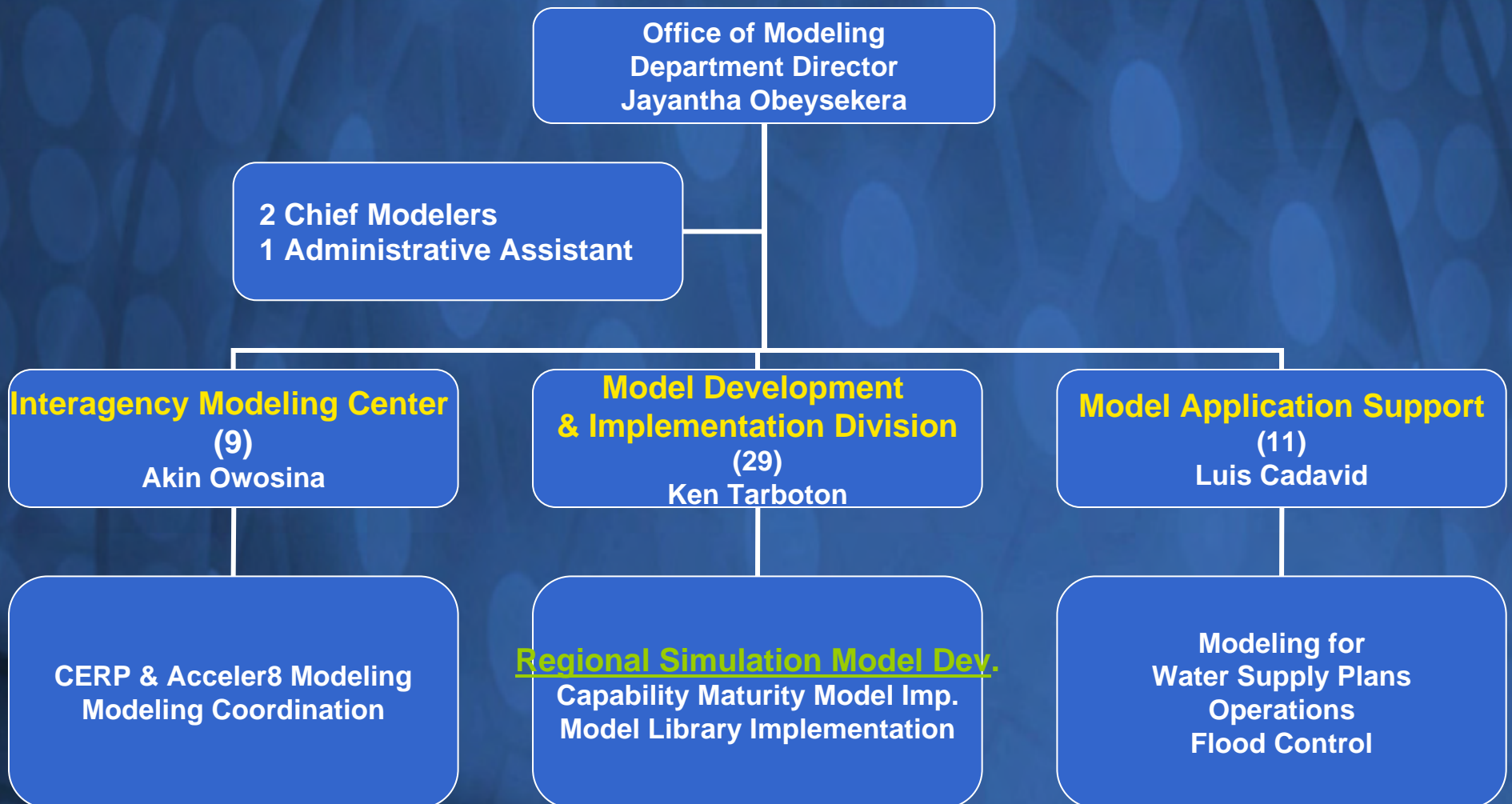
***Director, Office of Modeling***

## ***Peer Review Panel***

- David Chin, Ph.D., P.E., Professor of Civil and Environmental Engineering, University of Miami (Chair)
- John Dracup, Ph.D., P.E., Professor, Civil & Environmental Engineering, University of California at Berkeley
- Norm Jones, Ph.D., Professor, Department of Civil and Environmental Engineering, Brigham Young University
- Victor Miguel Ponce, Ph.D., Professor, Department of Civil and Environmental Engineering, San Diego State University
- Raymond Schaffranek, Research Hydrologist and Project Chief, US Geological Survey
- René Therrien, Ph.D., P.Eng., Professor, Department of Geology and Geological Engineering, Université Laval, Québec, Canada

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## Office Of Modeling Staff & Functions





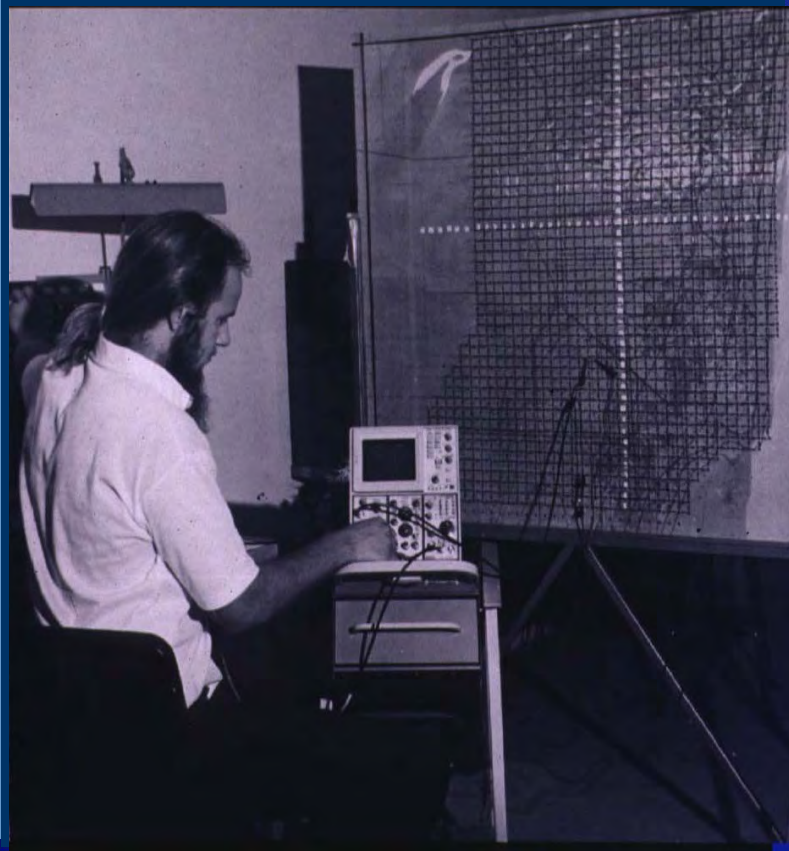
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## ***History of Modeling at SFWMD Prior to 70s***

- Most modeling was done by USACE
- Initial version of the Regional Routing Model ('pot model') with monthly time step

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## ***Decade of the 70s***



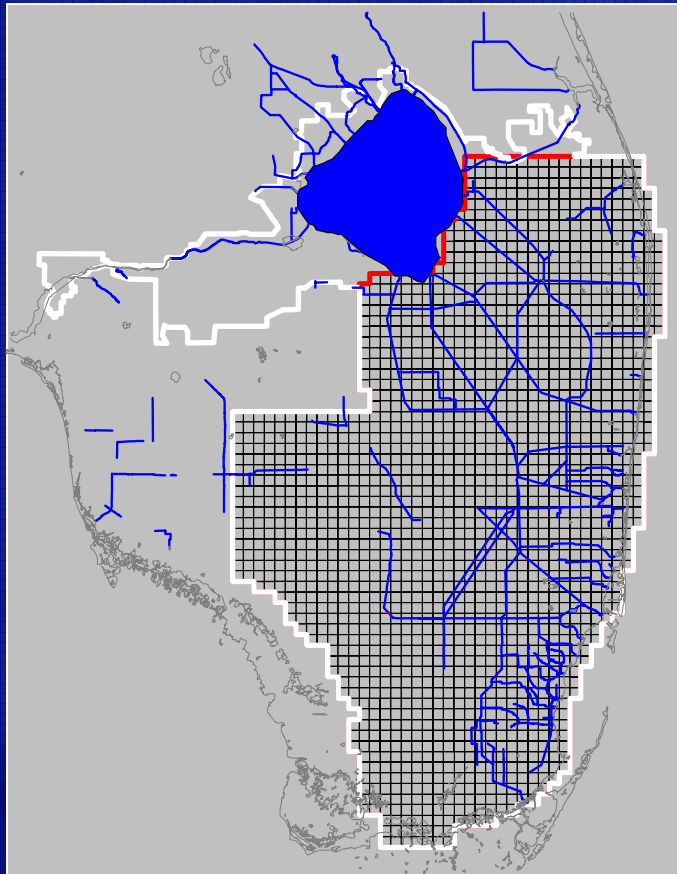
- **Electric Analog Model**
  - Simulated water levels and flows in coastal region
- **Upgraded Regional Routing Model to include daily time step**
- **Initial development of SFWMM (2x2)- a regional-scale computer simulation model**

## **Analog Model**



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## ***Decade of the 80s & 90s***



**2x2 Model**

- South Florida Water Management Model (SFWMM) a.k.a. 2x2 published
- Applied to USACE GDMs, West Dade wellfield, WMAs
- Natural System Model (NSM) developed
- Physical Modeling for Kiss. River Restoration
- Initial development of RSM







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# Physical Model at U.C. Berkeley

[sfwmd.gov](http://sfwmd.gov)



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## ***Why we needed RSM?***

- Move to a new generation of regional simulation models
- Need a tool that can handle South Florida
  - Hydrology, Operations, Management and Difficult Modeling Scenarios
- Easier learning curve to conduct regional modeling
- Need additional flexibility to simulate complex alternatives
- Need to use better algorithms, and recent technological advances
- Need to clearly separate hydrology and management of the south Florida water system

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## ***RSM Design Considerations***

- Regional in nature – simplifications may be needed
- Reproduce the functionality of SFWMM (daily, continuous simulation for planning applications)
- Reasonable run times
- Improved process and solution algorithms, use of advances in computer technology including programming languages, GIS and databases
- Better resolution than 2x2 in areas where it is needed
- Eliminate or minimize “single person dependency”
- Eliminate or minimize “hard coding” of simulation alternatives



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# RSM Components

**RSM**

**HSE**

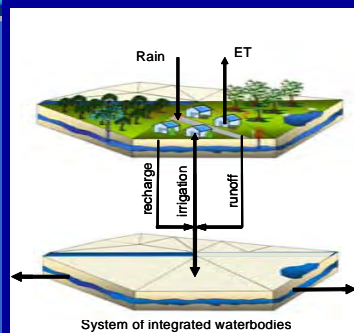
**MSE**

## Hydrologic Simulation Engine

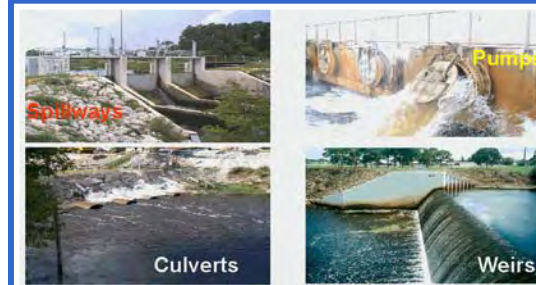


Regional mesh solution

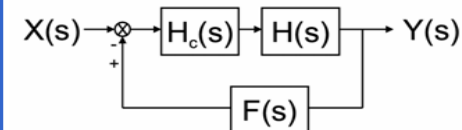
HPMs



## Management Simulation Engine



## Regional coordination



Controllers-Supervisors-  
Assessors

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***New technologies made this model possible***

RSM relies on three new technology building blocks

- Object-oriented code design
- New computational methods
- New and efficient numerical solvers for large matrices



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***RSM 2005 Project is helping us deliver a robust model that will be widely available to our partners***

RSM 2005 has four components:

- Applying Capability Maturity Model (CMM) principles to document our processes in model development
- Constructing a unified graphical user interface (GUI) for the model to make it easier to use
- Conducting a series of peer reviews to judge the model and its application as satisfactory, credible, and unbiased
- Producing two implementations for South Florida:
  - SFRSM, to simulate future alternatives in Everglades restoration and water supply projects
  - NSRSM, to simulate pre-drainage conditions to use as a baseline for Everglades restoration

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***We have a tremendous amount of information to share with you today and tomorrow***

Posters are scattered around the room with more details about:

- Capability Maturity Model (CMM)
- Graphical User Interface (GUI)
- RSM 2005 project timeline and team composition
- Management Simulation Engine (MSE) Overview
- Early test bed applications of RSM in the Everglades
- Maps of input data sets for the SFRSM and NSRSM implementations